

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

To:

see form PCT/ISA/220

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/JP2004/004177

International filing date (day/month/year)
25.03.2004

Priority date (day/month/year)

International Patent Classification (IPC) or both national classification and IPC
H04B10/18

Applicant
FUJITSU LIMITED

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
☐ a sequence listing
☐ table(s) related to the sequence listing
 - b. format of material:
☐ in written format
☐ in computer readable form
 - c. time of filing/furnishing:
☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/JP2004/004177

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	2-4,6-13,16-18
	No: Claims	1,5,14,15
Inventive step (IS)	Yes: Claims	2,3,11,12,16-18
	No: Claims	1,4-10,13-15
Industrial applicability (IA)	Yes: Claims	1-18
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1.1 Reference is made to the following document:

D1: US-A-2003/0081292

1.2 The document D1 is regarded as being the closest prior art to the subject-matter of **claim 1**, and discloses (the references in parentheses applying to this document):

A polarization mode dispersion compensator (cf. fig. 2) comprising:

- a) a polarization controller (cf. 12 in fig. 2 and par. 0062 on page 4) to transform polarization of an input optical signal;
- b) a compensating device (13,14 in fig. 2) to compensate for a polarization mode dispersion of the input optical signal and output an output optical signal;
- c) a signal quality monitor (cf. 3 in fig. 2) to measure quality of the output optical signal and generate a feedback signal indicating the measured quality of the output optical signal;
- d) a control unit (cf. 2,4 in fig. 2) to determine an amount of change of a control signal (cf. "setting information" in fig. 2) applied to the polarization controller for each feedback loop, by evaluating degree of polarization response to the control signal using a plurality of feedback signals generated in past feedback loops (cf. page 2, par. 0015), change the control signal by the determined amount, and apply a changed control signal to the polarization controller (cf. page 3, par. 43 and page 4, par. 0054-0055). Hence **claim 1** is not novel (Article 33(2) PCT).

1.3 **Claims 14 and 15** are directed to a control unit and a method of operating the system of claim 1 and are, as far as they can be understood (cf. points 3.1-3.4), not novel for analogous reasons as outlined under point 1.2 above (Article 33(2) PCT).

1.4 The following dependent claims do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the

PCT in respect of novelty or inventive step, the reasons being as follows:

Claim 4:

The subject-matter of these claims is rendered obvious by D1, cf. page 7, par. 0101. This claim is therefore not inventive (Article 33(3) PCT).

Claim 5:

The subject-matter of this claim is known from D1, cf. par. 0062 on page 4, and is therefore not novel (Article 33(2) PCT).

Claims 6-8:

These claims are not inventive, because their subject-matter merely relates to the application of measures which are well-known or standard engineering practice when applying birefringent elements as polarization controllers. A skilled person would therefore, in order to improve the operation of the polarization controllers, obviously employ the features of these claims without involving an inventive step as required by Article 33(3) PCT.

Claims 9 and 10:

The subject-matter of these claims merely relates to the implementation of the compensating device. A skilled person, trying to solve the problem of selecting a compensation device for the apparatus of D1, would need to select between the two exhaustive options of employing a compensating device with a fixed amount or variable amount of DGD. By doing so, he would in both cases necessarily arrive at the claimed features in an obvious way (Article 33(3) PCT).

Claim 13: The subject-matter of this claim relates to measures which are well-known in the field of monitoring optical signals and can therefore not be regarded as inventive (Article 33(3) PCT).

- 1.5** The expression "feedback loop" seems to be used as a means to designate different measurement cycles over time. Since in the field of optical polarisation compensation the term "feedback loop" has a well defined meaning, namely the structure of the signal path in the control loop with feedback, this expression is misleading and renders **claim 1** unclear (Article 6 PCT). The same unclarities as outlined above apply to **claims 14 and 15**, respectively. It should be noted that these claims have been interpreted in the sense of the "different measurement cycles over time" mentioned above.